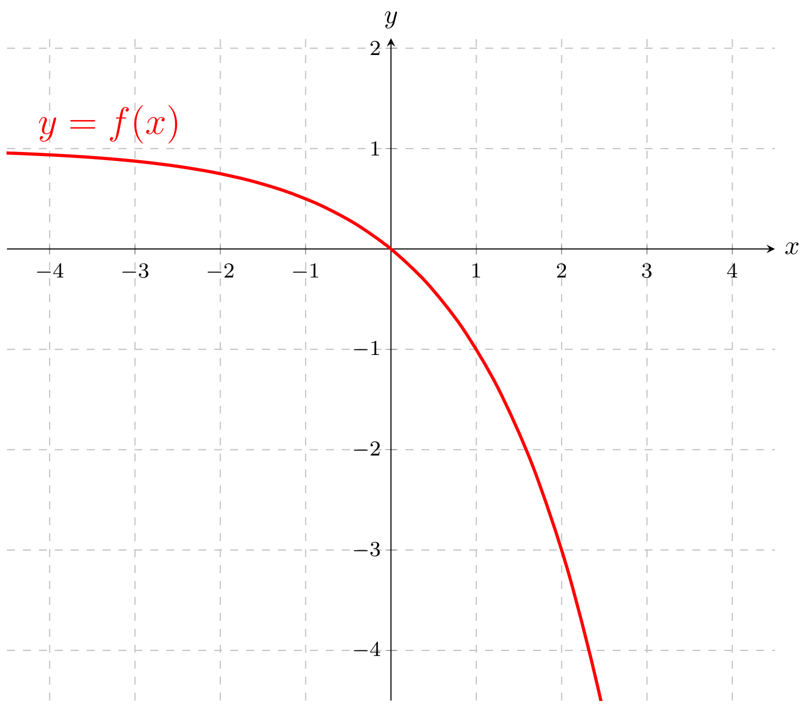
Part 1

Domain

D1.tex

Exercise 1 *The following is the graph of an exponential function, $f(x)$.*



Which of the following could be a formula for $f(x)$?

Multiple Choice:

(a) $-2^x + 1$ ✓

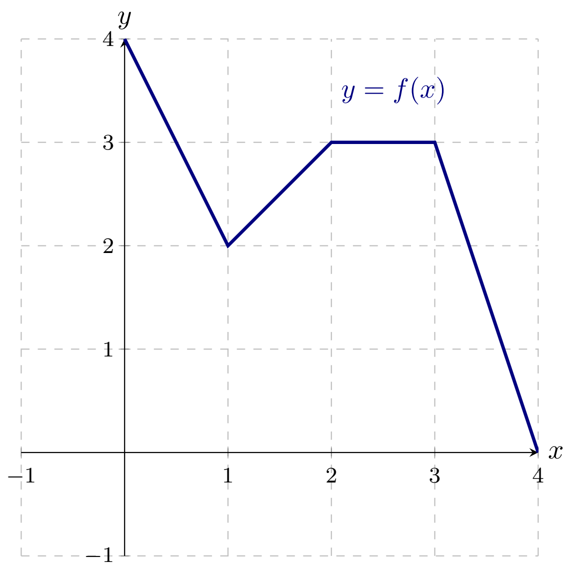
(b) $\left(\frac{1}{2}\right)^x - 1$

(c) $2^{-x} + 1$

(d) $\left(\frac{1}{2}\right)^{-x} - 1$

D2.tex

Exercise 2 *Use the graph of $y = f(x)$ and the table for $g(x)$ below to find the requested function values.*



x	$g(x)$
0	0
1	3
2	3
3	0
4	4

$$(f+g)(1) = \boxed{5}$$

$$(g-f)(2) = \boxed{0}$$

$$\left(\frac{f}{g}\right)(4) = \boxed{0}$$

$$\left(\frac{g}{f}\right)(2) = \boxed{1}$$

`D3.tex`

Let $f(x) = \dfrac{2x^2 - 4x + 5}{2x^2 - x}$.

Exercise 3 *How many vertical asymptotes does f have?* $\boxed{2}$.

Exercise 3.1 *They are at: (List them in order from left to right)*

$$x = \boxed{0} \quad \text{and} \quad x = \boxed{\frac{1}{2}}$$

Exercise 3.1.1 *The domain of f is: (List the intervals in order from left to right)*

$$\left(\boxed{-\infty}, \boxed{0}\right) \cup \left(\boxed{0}, \boxed{\frac{1}{2}}\right) \cup \left(\boxed{\frac{1}{2}}, \boxed{\infty}\right)$$

Exercise 4 *What is the end behavior of f?*

$$\text{As } x \to \infty, \quad f(x) \to \boxed{1}$$
$$\text{As } x \to -\infty, \quad f(x) \to \boxed{1}$$

Exercise 4.1 *Which of the following reasons justifies this? (Select all that apply)*

Select All Correct Answers:

(a) *The degree of the numerator is less than the degree of the denominator.*

(b) *The degree of the numerator equals the degree of the denominator.* ✓

(c) *The degree of the numerator is greater than the degree of the denominator.*

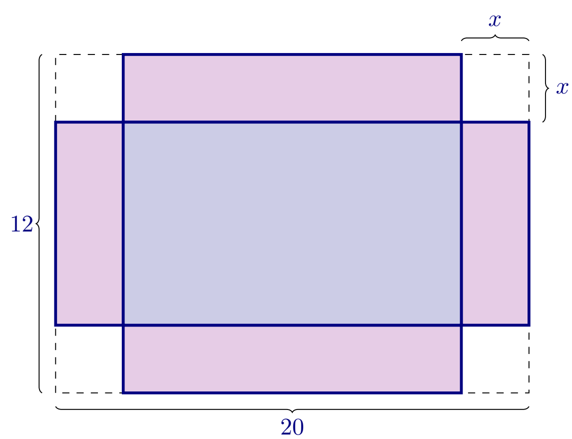
(d) *It is the ratio of the leading coefficients.* ✓

Exercise 4.1.1 *How many horizontal asymptotes does f have?* $\boxed{1}$.

Exercise 4.1.1.1 *It is at:* $y = \boxed{1}$.

D4.tex

Exercise 5 *A box with an open top is to be constructed from a rectangular piece of cardboard with dimensions* 12 cm *by* 20 cm *by cutting out equal squares of side x at each corner and then folding up the sides:*



Express the volume V of the box as a function of x. (In factored form)

$$V(x) = \boxed{x(20-2x)(12-2x)}$$

Feedback(*`attempt`*): *When folded up, what is the width of the box in terms of x? The length? The height?*

Exercise 5.1 *Multiply out your answer above:*

$$V(x) = \boxed{4}x^3 + \boxed{-64}x^2 + \boxed{240}x$$

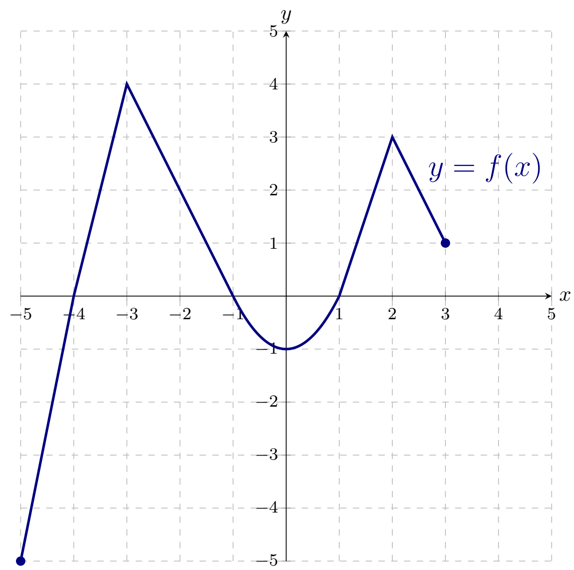
Exercise 5.1.1 *The domain of V is:*

$$\left[\boxed{0}, \boxed{6}\right]$$

Feedback(*`attempt`*): *Think about what x represents in the question. Can x be negative? Can the width or length of the box be negative?*

D5.tex

The entire graph of a function f is given below. Use the graph of f to answer the questions.



Exercise 6

Find the domain of f.

$$[\boxed{-5}, \boxed{3}]$$

Exercise 7

Solve $f(x) = 4$.

$$x = \boxed{-3}$$

Exercise 8 *Solve $f(x) \geq 0$ using intervals written from left to right.*

$$\left[\boxed{-4}, \boxed{-1}\right] \cup \left[\boxed{1}, \boxed{3}\right]$$

D6.tex

Exercise 9 *The function f is defined by the formula $f(x) = \dfrac{x-2}{3}$.*

The domain of f is $\left(\boxed{-\infty}, \boxed{\infty}\right)$.

Exercise 10 *The function g is defined by the formula $g(x) = 5$.*

The domain of g is $\left(\boxed{-\infty}, \boxed{\infty}\right)$.

Exercise 11 *The function k is defined by the formula $k(x) = 2x(x-4)$.*

The domain of k is $\left(\boxed{-\infty}, \boxed{\infty}\right)$.

D7.tex

Exercise 12 *The function f is defined by the formula $f(x) = 2\sqrt{x+3}$.*

The domain of f is $\left[\boxed{-3}, \boxed{\infty}\right)$.

Exercise 13 *The function g is defined by the formula $g(x) = \dfrac{2x}{x-1}$.*

The domain of g is $\left(\boxed{-\infty}, \boxed{1}\right) \cup \left(\boxed{1}, \boxed{\infty}\right)$.

Feedback(`attempt`): *Be sure to enter your intervals from left to right.*

Exercise 14 *The function k is defined by the formula* $k(x) = 2\sqrt{x+3} - \dfrac{2x}{x-1}$.

The domain of k is $\left[\boxed{-3}, \boxed{1}\right) \cup \left(\boxed{1}, \boxed{\infty}\right)$.

Feedback(`attempt`): *Be sure to enter your intervals from left to right.*

`D8.tex`

Exercise 15 *The function f is defined by the formula* $f(x) = \ln(5-2x)$.

The domain of f is $\left(\boxed{-\infty}, \boxed{\frac{5}{2}}\right)$.

Exercise 16 *The function g is defined by the formula* $g(x) = \sin(x)$.

The domain of g is $\left(\boxed{-\infty}, \boxed{\infty}\right)$.

Exercise 17 *The function k is defined by the formula* $k(x) = \sqrt[4]{3x+1}$.

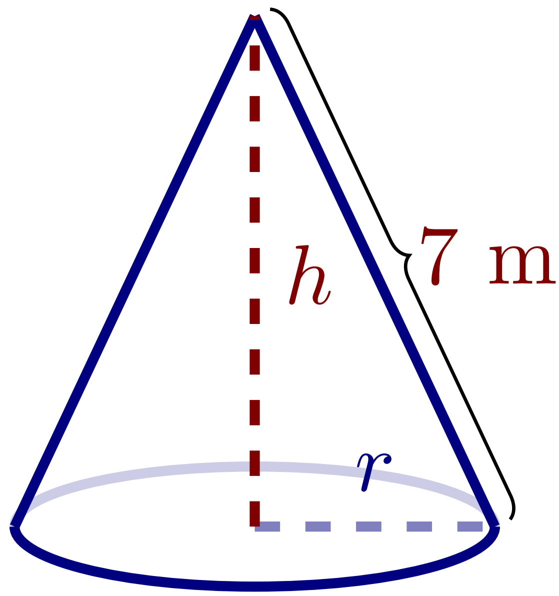
The domain of k is $\left[\boxed{-\frac{1}{3}}, \boxed{\infty}\right)$.

Exercise 18 *The function t is defined by the formula* $t(x) = 2\ln(5-2x) + 6\sin(x) - \sqrt[4]{3x-1}$.

The domain of t is $\left[\boxed{-\frac{1}{3}}, \boxed{\frac{5}{2}}\right)$.

`D9.tex`

A right circular cone has a **fixed slant height** of 7 m. Call h the height of the cone and r the radius, as in the figure below.



Exercise 19 *h is a function of r. The formula for $h(r)$ is given by:*

$$h(r) = \boxed{\sqrt{49 - r^2}}$$

.

Hint: *Notice that h and r form the legs of a right triangle with the slant height of the cone as its hypotenuse. Think about the Pythagorean Theorem $a^2 + b^2 = c^2$.*

Exercise 19.1 *The domain of h is:* $\left[\boxed{-7}, \boxed{7}\right]$.

Hint: *You know that $49 - r^2$ can not be negative. Try plotting the parabola $y = 49 - x^2$ and seeing where the graph is above the x-axis.*